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Smart Agro System

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ABSTRACT

Agriculture is primary source of income of many Indian families Agriculture is primary source of income of many Indian families.Our traditions and culture are mostly inclined on agriculture.But nowadays it is slowly fading out due to severe reason.One of the main reason is low MSP and low graded production due to increased on specified demand.So there is need to produce a grain with satisfied need.As per time there is need in up gradation of system.Same analogy can be applied in agricultural sector as well.Precision and advanced agricultural techniques should be adopted to increase the production.Main reason to chase such target is to relate soil and plant relationship.Many factor such as ph ,soil moisture content and nutrient level are responsible for the fertility of the soil.The major aim of this project is to determine the NPK level ie nitrogen, phosphorus and potassium level respectively.A colour sensor is used to detect the presence of respected levels in the soil.

Soil is recognized as one of the most valuable natural resource whose soil pH property used to describe the degree of acidity or basicity which affect nutrient availability and ultimately plant growth. Fifty soil samples were collected and their pH was determined by using digital image processing technique. Soil colour is visual perceptual property corresponding in humans to the categories i.e red, green, blue and others. Soil colours are the parts of visual perceptual property where digital values of red, green and blue (RGB) provide a clue for spectral signature capture of different pH in soil. For the capturing images, digital camera was used. Transformation of the multispectral image was carried out through TNT Mips spatial software.

Keyword:-Moisture, Soil, NPK, pH.

1 .INTRODUCTION

In today's era technology incorporates a huge and Efficient impact on society. Technology is bringing major Changes within the living of humans. It has its application in various fields like banking, communication, business, health care. Technology conjointly has its valuable impact within the field of agriculture. Day by day ease in farming and crop production is improving, but one aspect which can't be compromise is that of soil quality and nutrition deficiency in it [1].

In India Conventional farming practice involves human labors for performing all types of farming activities like watering fields, cultivating crops with required fertilizers etc. Soil analysis is a valuable tool for farmers; it determines the inputs required for efficient and economical production. A proper soil test will help to ensure the application of enough fertilizer to meet the requirements of the crop while taking advantage of the nutrients already present in the soil. It will also allow you to determine lime requirements and can be used to diagnose problem areas. Sampling technique is correct; as the results are only as good as the sample you take. Soil testing is also a requirement for farms that must complete a nutrient management plan. Major nutrients: Nitrogen (N), Phosphorus (P) and Potassium (K) Soil pH is the most commonly measured soil properties. It is also one of the most useful and informative soil parameters because of its relationship to many aspects of soil fertility and plant growth. Despite its importance, the implications of inadequate soil pH on forage response, particularly nutrient use efficiency, are often overlooked.[2]

Agriculture demands for proper management of agriculture resources that satisfy augmented demand for food. To accomplish a healthy life, there is a need for precision agriculture which provides advanced technologies like the sensors, wireless networks, mobile applications and IOT [3] etc. Potassium- it's liable for the living of over eighty enzymes everywhere the plant part that is responsible for the plant's ability to survive in extreme cold and hot areas and conjointly to survive in varied climatic disasters like drought and floods [4, 5].

2. PRESENT WORK

2.1Block Diagram

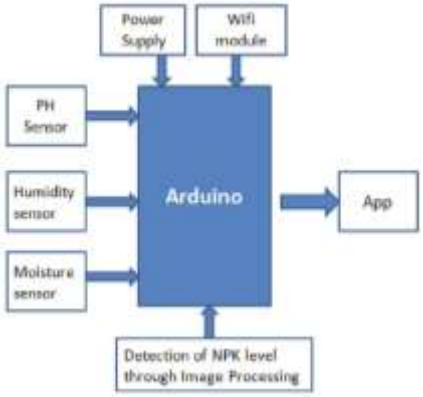

Fig -1: Block diagram

2.1.1Transmitter

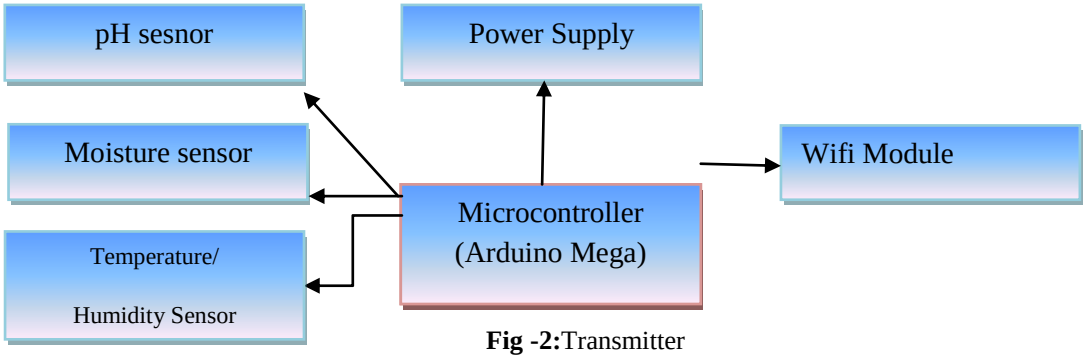

Fig -2: Transmitter

2.1.2 Receiver

Fig -3: Receiver

2.2 System requirements

2.2.1 Hardware requirements

- Arduino Mega 2560
- Wifi Module ESP8266
- Soil Moistuer sensor
- Temperature / Humidity sensor
- Ph Meter

2.2.2 Software requirements

- Arduino Software
- MATLAB
- Bynk app Dashboard

3. DETECTION OF NPK USING SVM ALGORITHM

3.1Support vector machine (SVM)

SVM is a non-linear classifier, and is a newer trend in machine learning algorithm. SVM is popularly used in many pattern recognition problems including texture classification. SVM is designed to work with only two classes. This is done by maximizing the margin from the hyper plane. The samples closest to the margin that were selected to determine the hyper plane is known as support vectors. Multiclass classification is applicable and basically built up by various two class SVMs to solve the problem, either by using one-versus-all or one. Another feature is the kernel function that projects the non-linearly separable data from low-dimensional space to a space of higher dimension so that they may become separable in the higher dimensional space too.

The first step in the proposed approach is to capture the sample from the digital camera and extract the features. The sample is captured from the digital camera and the features are then stored in the database.Preprocessing images is used to removing low-frequency background noise. Normalizing the intensity of the individual particles of images. It enhance the visual appearance of images. Improve the manipulation of datasets. It is the technique of enhancing data images prior to computational processing. The caution is enhancement techniques can emphasize image artifacts, or even lead to a loss of information if not correctly used. The steps involved in preprocessing are to get an input image and then the image has to be enhanced. Then the RGB image is converted to an gray scale image to get an clear identification of pests on leaves. Noise removal function can be performed by using filtering techniques. Mean filtering: The 3x3 sub-region is scanned over the entire image. At each position the center pixel is replaced by the average value. Median filtering: The 3x3 sub-region is scanned over the entire image. At each position the center pixel is replaced by the median value.

The PSNR value is calculated for both the mean and median filter. Based on the PSNR value one of the filtering image is taken for a further process. For mean filtering, the PSNR value is 23.78 and the PSNR value for median filtering is 12.89. The higher the PSNR, the better the quality of the compressed or reconstructed image. Therefore the mean filtering is taken for the further process.

Image segmentation in general is defined as a process of partitioning an image into homogenous groups such that each region is homogenous but the union of no two adjacent regions is homogenous. Image segmentation is performed to separate the different regions with special significance in the image . These regions do not intersect each other. Blob detection helps to obtain Regions of Interest for further processing. It is applied for the presence of same type of objects in multiples. Segment the objects of interest from the complex background.

4.OBSERVATION

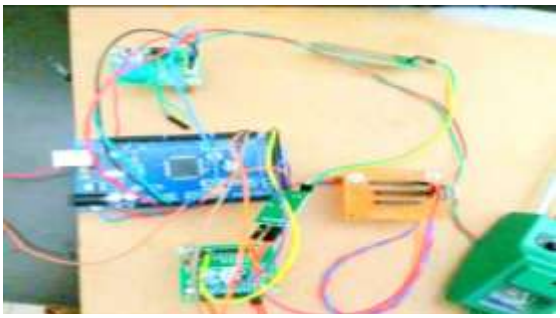

Fig-4: Working Model

The Step by step approach in designing the system for measurement of four essential parameters for plant growth, i.e. temperature, humidity, pH and moisture, has been followed. The results obtained from the measurement are quite reliable and accurate.

Fig -5:Output in Blynk app

The Photo clicked by the Farmer is uploaded for NPK analysis.

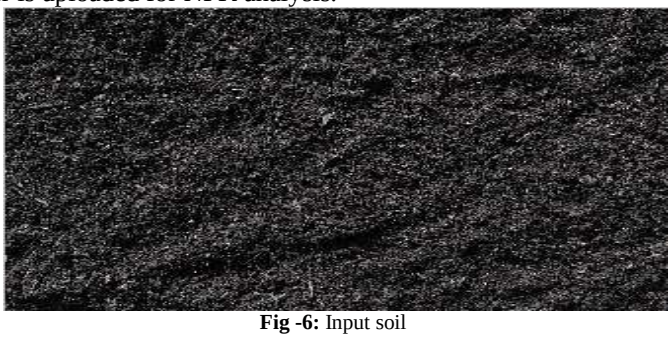

Fig -6: Input soil

The RGB values are stored in the GLCM intensity pixel matrix. The image is converted to grey scale for measuring the intensity of light to at each pixel in a single band

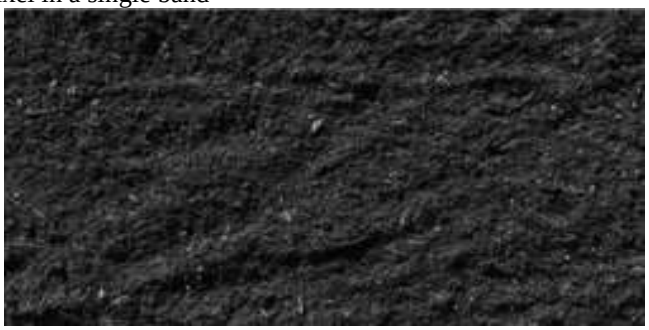

Fig -7: Grey Scale analysis

The photo is processed using Adaptive histogram analysis to improve the contrast in images.

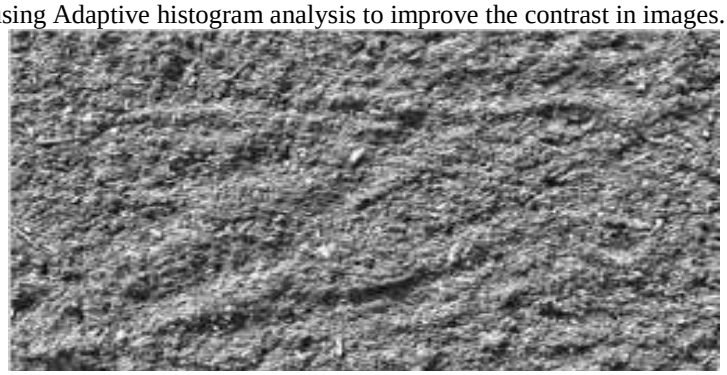

Fig -8: Adaptive Histogram image

After extracting all the features from GLCM matrix i.e, Color , Shape and texture characteristics the ratio of NPK is detected.

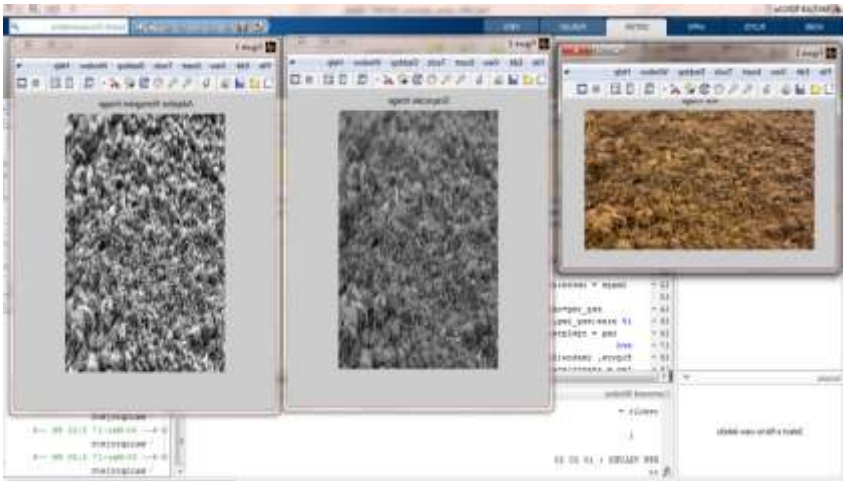

Fig -9: Result of NPK

5. CONCLUSION

This paper proposed a soil image pattern classification to identify NPK with a combination of texture and color feature extraction. Initially the farmers sends a digital image of the NPK of a plant and these images are read in MATLAB and processed automatically based on SVM and the results were shown.
In the future, with the help of this research we can predict suitable crops for that soil and we can use our soil predictor in laboratories for accurate and fast results. In the future, with the help of this research we can predict suitable crops for that soil and we can use our soil predictor in laboratories for accurate and fast results.

6. REFERENCES

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